REPORT NO. 80-2-1

3430
OCTOBER 1979

BIOLOGICAL EVALUATION OF THE SOUTHERN PINE BEETLE ON THE TALLADEGA AND TUSKEGEE NATIONAL FORESTS IN ALABAMA

by

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INTRODUCTION

A biological evaluation was conducted on the Talladega and Tuskegee National Forests the weeks of September 17 and 24, 1979. This evaluation included the Talladega, Shoal Creek, Oakmulgee, and Tuskegee Districts. The purpose of the evaluation was to determine the current status of the southern pine beetle (Dendroctonus frontalis Zimmerman) populations on the Forests and to determine what action, if any, would be necessary in FY 80.

METHOD OF EVALUATION AND ANALYSIS OF SPB INFESTATION

Aerial Survey and Ground Checks

Standard aerial sketch map procedures were used for this evaluation, except that survey coverage was 100 percent.[2/] The survey was made by district personnel and SPB spots of red and/or fading trees were recorded and plotted on Forest Service Class A maps. A minimum of 10 spots were examined on each district, except the Tuskegee. Inclement weather prevented the completion of ground checking on the Tuskegee District. The Tuskegee District had, however, marked enough SPB spots so that the tally sheets could be used for data analysis purposes. Ground check data, including number of vacated and infested trees, were recorded. Bark samples (3.1 dm^2) for attack:emergence analysis were collected on all districts except the Tuskegee.[3/]

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2/ Detection of Forest Pests in the Southeast, 1970. USDA, Forest Service, Southeastern Area, State and Private Forestry, Publ. S&PF-7. Atlanta, Ga. 51 pp.

3/ Moore, G. E. 1977. Factors for determining trends in southern pine beetle spots. J. Environ. Entomol. Vol. 7, No. 3. pp. 335-341.

Attack:Emergence Evaluation

The attack:emergence analysis procedure for estimating subsequent tree mortality from SPB infestations was adapted as a predictive tool.[4/] [5/] This procedure predicts future spot growth based on the ratio of southern pine beetles entering the trees to the number of beetles emerging (this is both attacking adults and developed brood). This procedure will be henceforth referred to as the attack:emergence ratio. A prediction of SPB increase would require an attack:emergence ratio of 1:10 or greater. Attack:emergence ratios for spots predicted to remain static in growth would be 1:5-1:9.9. A decreasing population would have an attack:emergence of less than or equal to 1:4.9. This procedure has been proven on a spot basis for a 2-year period in North Carolina.[6/] This evaluation assumes that spot growth as predicted by the attack:emergence bark sample analysis is indicative of SPB population growth on the forest on an area basis.

For example, if attack:emergence ratios predict increased populations within the sample spots, then the assumption would be than an increased amount of volume will be lost (or an increased number of trees will be killed) by SPB area-wide on the district.

Volume Protected Determination

The volume which would be protected by a SPB suppression project was estimated by use of spot growth formulae. Spot growth formulae estimate the amount a s pot would grow if not salvaged. The difference between salvage volume and the volume the spot would have grown to if left alone is the volume protected.[7/]

RESULTS

Aerial Survey and Ground Checks

Two hundred and four SPB spots were found on the Talladega District ranging from 5 to > 200 trees. Ground checks revealed that many of the spots (60 percent of our sample) had longleaf pine (Pinus palustris Mill) as the host species. This is an indicator of high beetle populations since longleaf is not usually a preferred host of the SPB. Results of the ground check and attack:emergence data are summarized in table 1.

Seventy-four SPB spots were found on the Shoal Creek District ranging from 5 to > 200 trees. Results of the ground check and attack:emergence evaluation are summarized in table 2.

4/ Moore, op cit.

5/ This methodology is being used on a trial basis. Further analysis and evaluation must be made before further use.

6/ Moore, op cit.

7/ Hedden, R. L. 1979. Southern pine beetle spot growth inactivity in East Texas. Forest Sci. In press.

Table 1. Summary of ground check data and attack:emergence bark analysis data for Talladega National Forest, September 1979

Talladega District	Total	Infested Trees			Vacated Trees	A:E Ratios	Red:Green[a/] Ratio
		Total	Green	Red & Fading			
	337	117	86	31	220	1:4.76	1:2.77
	898	398	250	148	500	1:8.79	1:1.69
	69	69	43	26	-	-[b/]	1:1.65
	164	156	135	21	8	1:14.67	1:6.43
	100	96	90	6	4	1:10.50	1:15
	2787	604	504	100	2183	1:9.13	1:5.04
	2800	600	450	150	2200	1:10.20	1:3.0
	17	12	10	2	5	1:6.33	1:5.0
	38	38	38	-	-	-[b/]	38x
	81	-	-	-	81	-[b/]	-
						$\bar{x}$ = 1:9.20	

[a/] Based on numbers of infested red and fading trees compared to number of green infested trees. Average R:G ratio equals 1:3.5; that is, an average of 3.5 infested trees is present for each infested red or fading tree in the sample spot.

[b/] No attack:emergence ratio was calculated for inactive spots because of methodology recommended by G. E. Moore (see footnote 3 in text).

Table 2. Summary of ground check data and attack:emergence bark analysis data for Talladega National Forest, September 1979

Shoal Creek District	Total	Infested Trees			Vacated Trees	A:E Ratios	Red:Green Ratio [a/]
		Total	Green	Red & Fading			
	2,431	1,431	321	1,110	1,000	1:9.33	1:.29
	184	139	105	34	45	1:13.64	1:3.09
	192	163	145	18	29	1:11.17	1:8.06
	763	363	283	80	400	1:15.67	1:3.54
	235	233	201	32	2	1:12.60	1:6.28
	26	20	12	8	6	1:12.49	1:1.50
	174	150	122	28	24	1:13.03	1:4.36
	12	-	-	-	12	- [b/]	-
	59	57	49	8	2	1:14.23	1:6.13
	24	12	6	6	12	1:15.68	1:1
						$\bar{x}$ = 1:12.37	

a/ Based on numbers of infested red and fading trees compared to number of green infested trees. Average R:G ratio equals 1:3.81; that is, an average of 3.81 green infested trees is present for each infested red or fading tree in the sample spots.

b/ No attack:emergence ratio was calculated for inactive spots because of methodology recommended by G. E. Moore (see footnote 3 in text).

Sixty-four SPB spots were found on the Oakmulgee District. Spot sizes ranged from < 5 trees to > 1,000 trees. Results of the ground check data and attack:emergence evaluation are summarized in table 3.

Fifteen SPB spots were found on the Tuskegee District. Spot sizes ranged from 20 trees to > 800 trees. All spots had been marked for sale. Two spots were examined in the field, but heavy rains prevented further ground checking. Data for the remaining thirteen spots were obtained from field tally sheets provided by the district. No attack:emergence ratios were taken due to the inclement weather. Results of the ground check can be found in table 4.

Attack:Emergence Evaluation

Attack:emergence ratios ranged from 1:6.87 on the Oakmulgee District to 1:12.37 on the Shoal Creek District. The Oakmulgee, Talladega, and Tuskegee Districts can expect a 1 - 1.5 factor increase in SPB losses during FY 80. The Shoal Creek District can expect losses to increase by a factor of up to 3 times the losses experienced in FY 79.

Volume Protected Determination

Total volume protected as derived from Hedden's spot growth formula was found to be 27,451 MBF for all districts covered by this report.

DISCUSSION AND RECOMMENDATIONS

SPB suppression activities should continue on this forest. Salvage control actions will minimize losses and prevent spot growth by removing infested material from the forest. Chemical suppression and/or cut-and-leave tactics are recommended only for inaccessible spots or for small spots that cannot be administered any other way. Forest Insect and Disease Management, Pineville, Louisiana should be contacted prior to the extensive use of chemical control for an update on latest restrictions or application procedures. If cut-and-leave is to be used, district personnel should plan a training session with FI&DM before the summer season (the summer is the only time this method is recommended for use). All suppression activity should be done in accordance with the 3400 section, FSM, and the project control plan for the forest.

Extremely high populations of SPB are present on all National Forest lands evaluated in this report. This high SPB population is characterized by rapid spot growth (see R:G ratios and attack:emergence data; tables 1 - 4) and spots up to 50 acres in size. Attack:emergence ratios indicate a static to increasing population of southern pine beetles. Southern pine beetle losses on these districts can be expected to increase for FY 80. The Talladega, Shoal Creek, Oakmulgee, and Tuskegee Districts have vigorous SPB populations. Large volumes on these districts

Table 3. Summary of ground check data and attack:emergence bark analysis data for Talladega National Forest, September 1979

Oakmulgee District	Total	Infested Trees			Vacated Trees	A:E Ratios	Red:Green[a/] Ratio
		Total	Green	Red & Fading			
	895	383	317	66	512	1:10.15	1:4.80
	113	56	45	11	57	1:7.36	1:4.09
	195	188	149	39	7	1:5.19	1:3.82
	137	44	30	14	93	1:3.54	1:2.14
	156	79	73	6	77	1:10.78	1:12.2
	92	44	33	11	48	1:3.90	1:3.0
	138	84	44	40	54	1:4.04	1:1.1
	159	142	108	34	617	1:4.38	1:3.2
	95	83	76	7	12	1:13.45	1:10.9
	74	45	36	9	29	1:5.95	1:4.0
						$\bar{x}$ = 6.87	

a/ Based on numbers of infested red and fading trees compared to numbers of green infested trees. Average R:G ratio equals 1:4.9; that is, an average of 1:4.9 green infested trees is present for each infested red or fading tree in the sample spots.

Table 4. Summary of ground check data and attack:emergence bark analysis data for Talladega National Forest, September 1979

Tuskegee District	Total Trees	Infested Trees			Vacated Trees	A:E Ratio[a]	Red:Green Ratio[b]
		Total	Green	Red & Fading			
	281	187	126	61	94	-	1:2.07
	146	97	80	17	49	-	1:4.71
	310	205	110	95	105	-	1:1.16
	355	173	101	72	182	-	1:4.02
	864	408	229	179	456	-	1:1.28
	93	34	24	10	59	-	1:2.40
	53	17	12	5	36	-	1:2.40
	313	112	73	39	201	-	1:1.87
	268	167	106	61	101	-	1:1.74
	394	215	145	70	179	-	1:2.07
	40	27	20	7	13	-	1:2.86
	348	227	138	89	121	-	1:1.55
	58	29	23	6	29	-	1:3.83
	193	111	67	44	82	-	1:1.52

[a] Bark samples were not taken from this district due to heavy rains.

[b] Based on numbers of infested red and fading trees compared to numbers of green infested trees. Average R:G ratio equals 1:1.66; that is, an average of 1.66 green infested trees is present for each infested red or fading tree in the sample spots.

are affected and an increase in SPB activity is projected. Each district needs to plan enough technician time to implement the work required to meet project objectives for FY 80.

The State of Alabama also has a high SPB population with > 3,000 spots reported for August 1979.[8/] Every effort should be made to cooperate with the Alabama Forestry Commission in controlling the SPB. The sharing of information obtained from flight maps and ground checks will facilitate this cooperation. Where problems with intermingled ownerships occur, contact the Alabama Forestry Commission pest control section in Montgomery, Alabama (telephone 205-832-5816).

While direct suppression activities are necessary, it is also possible to reduce future losses through preventative measures. Maintaining healthy, thrifty stands is one of the better ways to prevent SPB losses. Here are stand conditions the prescriptionist should look for to reduce SPB losses:

1. Avoid basal areas in excess of 120 sq ft/ac. Older, dense stands should be thinned as heavily as R-8 guides allow.

2. Make sure species is matched to site.

3. Note presence of littleleaf or annosus root rot sites. These sites have been shown to be problem SPB areas.

4. Plan for as little disturbance as possible when these stands are thinned. Damaged stands are more susceptible to bark beetle attack.

For further information, contact Forest Insect and Disease Management, Pineville Field Office, Pineville, La. 71360 (telephone FTS 497-3311, or Commercial 318-445-6511, Ext. 311).

8/ Hyland, James R. 1979. Southern pine beetle status report. Alabama Forestry Commission.